(1) $c = 7$

$10 = 9a + 3b + 7 \rightarrow 3 = 9a + 3b \Rightarrow 1 = 3a + b \rightarrow 1 - 3a = b$

$10 = 182.25a + 13.5b + 7 \rightarrow 3 = 182.25a + 13.5b$

$3 = 182.25a + 13.5(1 - 3a)$

$3 = 182.25a + 13.5 - 40.5a$

$-10.5 = 141.75a$

$\frac{-1050}{14175} = a$

$\frac{-2}{27} = a$

$1 - 3a = b$

$1 - 3\left(\frac{-14}{189}\right) = b$

$1 + \frac{14}{63} = b$

$1\frac{2}{9} = b$

35° shot: $y = -\frac{2}{27}x^2 + \frac{11}{9}x + 7$

$c = 7$

$12 = 121a + 11b + 7 \rightarrow 5 = 121a + 11b \rightarrow \frac{5}{11} - 11a = b$

$10 = 182.25a + 13.5b + 7 \rightarrow 3 = 182.25a + 13.5b$

$3 = 182.25a + 13.5\left(\frac{5}{11} - 11a\right)$

$3 = \frac{729}{4}a + \frac{135}{22} - \frac{297}{2}a$

$3 - \frac{135}{22} = \frac{729}{4}a - \frac{594}{4}a$

$\frac{-69}{22} = \frac{135}{4}a$

$\frac{4}{135}\cdot\frac{-69}{22} = a$

$\frac{-46}{495} = a$

45° shot: $y = \frac{-46}{495}x^2 + \frac{731}{495}x + 7$

$\frac{5}{11} - 11\left(\frac{-46}{495}\right) = b$

$\frac{5}{11} + \frac{46}{45} = b$

$c = 7$

$12.5 = 16a + 4b + 7 \rightarrow 5.5 = 16a + 4b \rightarrow 1\frac{3}{8} - 4a = b$

$10 = 182.25a + 13.5b + 7 \rightarrow 3 = 182.25a + 13.5b$

$3 = 182.25a + 13.5\left(\frac{11}{8} - 4a\right)$

$3 = \frac{729}{4}a + \frac{297}{16} - 54a$

$-\frac{249}{16} = \frac{513}{4}a$

$\frac{4}{513} \cdot \frac{-249}{16} = a$

$\frac{-83}{684} = a$

$\frac{11}{8} - 4\left(\frac{-83}{684}\right) = b$

$\frac{11}{8} + \frac{83}{171} = b$

$\frac{1881}{1368} + \frac{664}{1368} = b$

$\frac{2545}{1368} = b$

53° short: $y = -\frac{83}{684}x^2 + \frac{2545}{1368}x + 7$

(16) 35° shot: $y = -\frac{2}{27}x^2 + \frac{11}{9}x + 7$

$$x = \frac{-\frac{11}{9}}{2(-\frac{2}{27})}$$

$$x = \frac{-\frac{11}{9}}{-\frac{4}{27}}$$

$x = -\frac{11}{9} \cdot -\frac{27}{4}$

$x = 8.25$

$y = -\frac{2}{27}(8.25)^2 + \frac{11}{9}(8.25) + 7$

$\boxed{y = 12.042 \text{ ft.}}$

45° shot: $y = -\frac{46}{495}x^2 + \frac{731}{495}x + 7$

$$x = \frac{-\frac{731}{495}}{2(-\frac{46}{495})}$$

$x = 7.946$

$y = -\frac{46}{495}(7.946)^2 + \frac{731}{495}(7.946) + 7$

$\boxed{y = 12.867 \text{ ft.}}$

53° shot: $y = -\frac{83}{684}x^2 + \frac{2545}{1368}x + 7$

$x = \frac{-\frac{2545}{1368}}{2\left(-\frac{83}{684}\right)}$

$x = 7\frac{2}{3}$

$y = -\frac{83}{684}\left(7\frac{2}{3}\right)^2 + \frac{2545}{1368}\left(7\frac{2}{3}\right) + 7$

$\boxed{y = 14.131 \text{ ft.}}$

(1c) 35° shot: $y = -\frac{2}{27}x^2 + \frac{11}{9}x + 7$ Rim is at (13, 10)

Need to shift parabola left $\frac{1}{2}$ ft.

35° shot: $y = -\frac{2}{27}\left(x - 8\frac{1}{4}\right)^2 + 12.042$

↑ shift left $\frac{1}{2}$ unit

$\boxed{\text{New equation: } y = -\frac{2}{27}\left(x - 7\frac{3}{4}\right)^2 + 12\frac{21}{500}}$

45° shot: $y = -\frac{46}{495}\left(x - 7\frac{473}{500}\right)^2 + 12\frac{861}{1000}$

$\boxed{\text{New equation: } y = -\frac{46}{495}\left(x - 7\frac{3}{4}\right)^2 + 12\frac{867}{1000}}$

53° shot: $y = -\frac{83}{684}\left(x - 7\frac{1}{6}\right)^2 + 14\frac{131}{1000}$

$\boxed{\text{New equation: } y = -\frac{83}{684}\left(x - 7\frac{1}{6}\right)^2 + 14\frac{131}{1000}}$

(1d) Move each parabola up 3 units

35° shot: $y = -\frac{2}{27}\left(x - 8\frac{1}{4}\right)^2 + 15\frac{21}{500}$

45° shot: $y = -\frac{46}{490}\left(x - 7\frac{413}{500}\right)^2 + 15\frac{867}{1000}$

53° shot: $y = \frac{-83}{684}\left(x - 7\frac{3}{5}\right)^2 + 17\frac{131}{1000}$